



# **Governor's Drought Advisory Committee Meeting**

**May 18, 2006**

**National Weather Service**

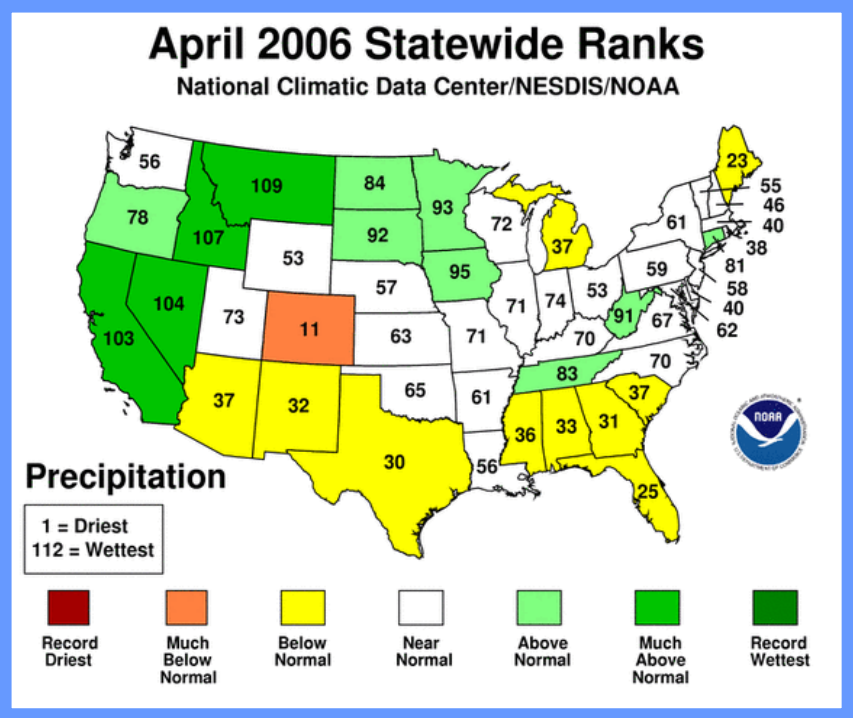
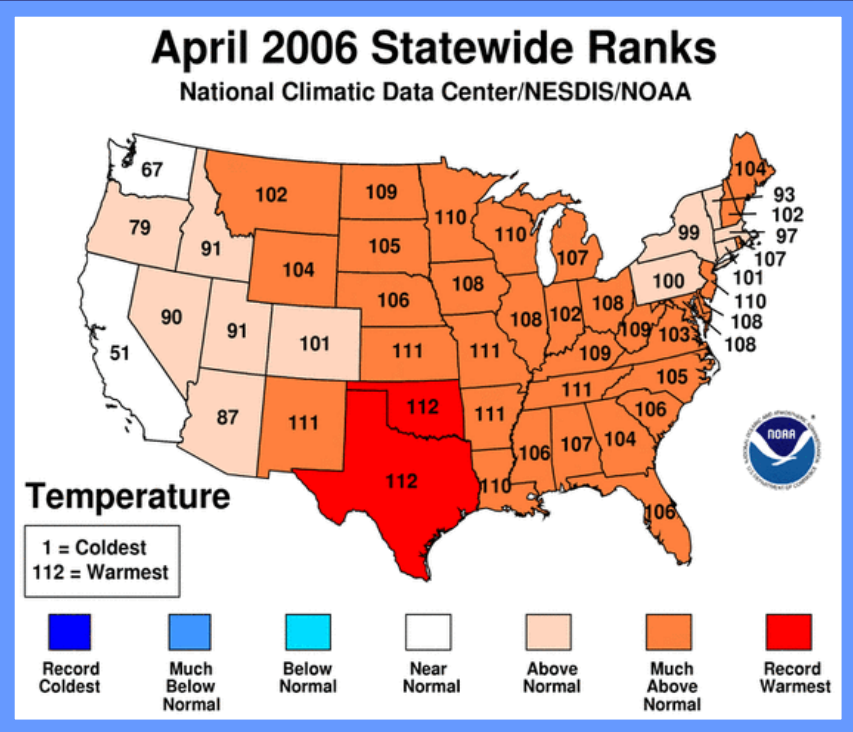
**Gina Loss**



# April 2006

## Warm and wet!

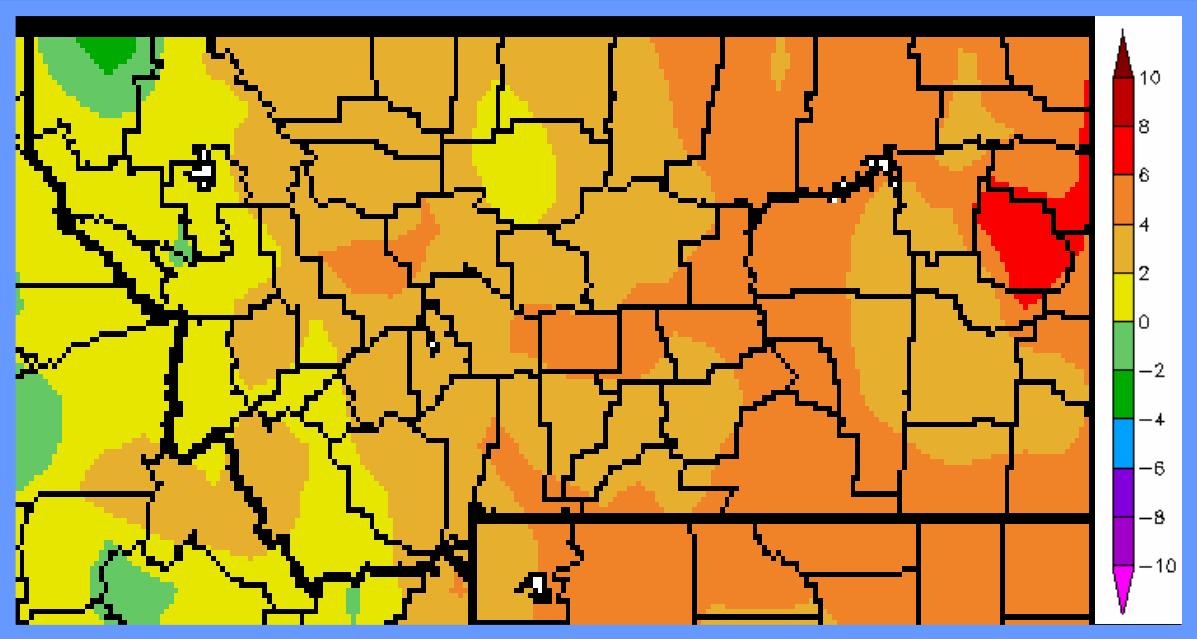
- Of 112 years of record...
- 11<sup>th</sup> warmest
- 4<sup>th</sup> wettest





# Average Temperature

## April 2006

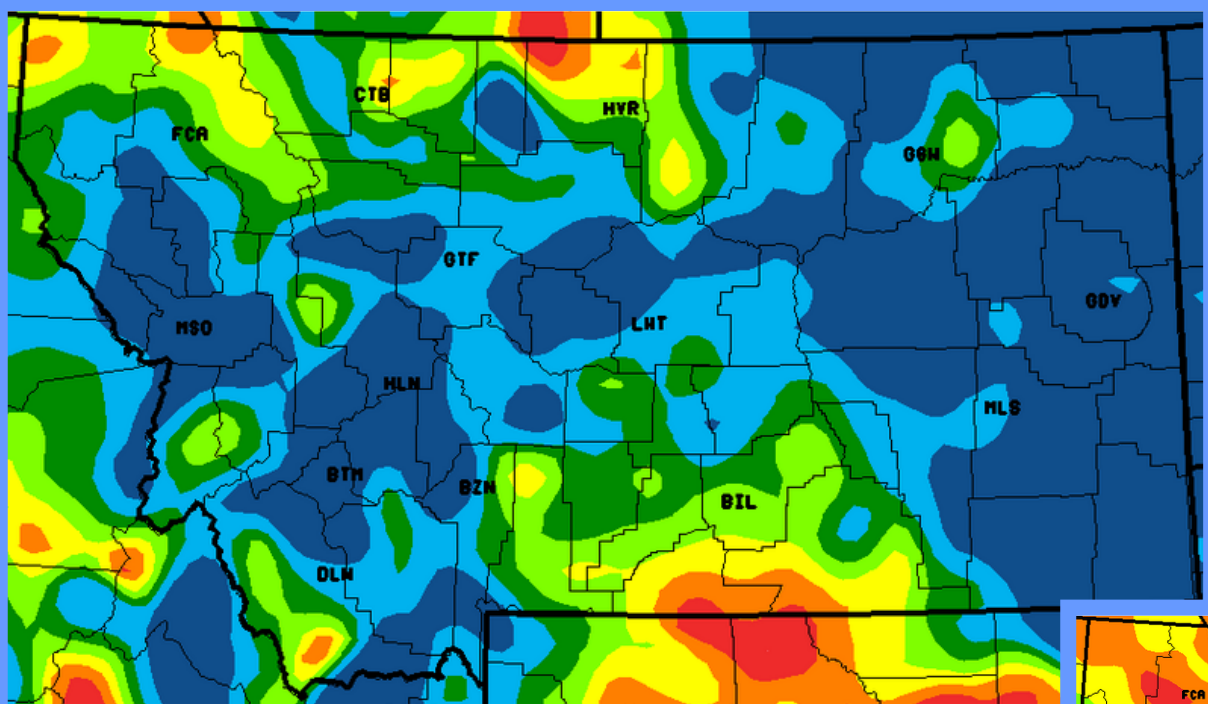


- Near to above average
  - West – Near average
    - -4 to +2 °F
  - Central and East – Above average
    - +2 to +8 °F
- March – Near average



# Percent of Normal Precipitation

## April 2006



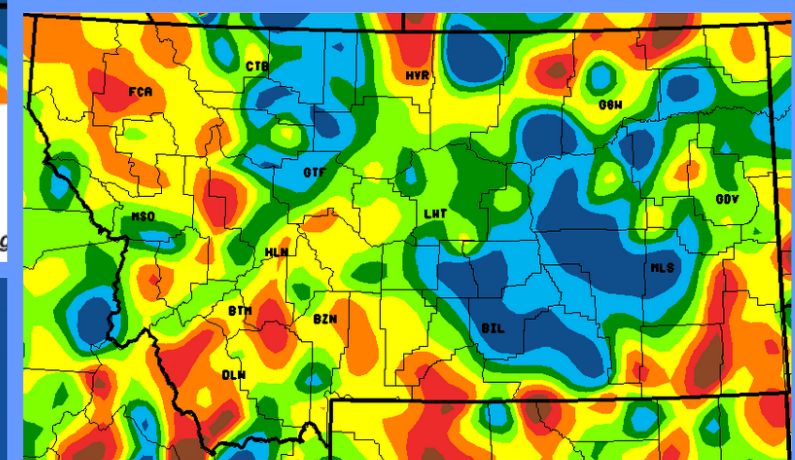
April 2006 Percent of Normal Precipitation  
Period of Normal: 1971-2000

20 40 60 85 115 150 200

NOTE: Data used to generate this image are  
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov>

- Most of Montana above to much above normal
- Areas below normal generally small and isolated
  - Northwest
  - North central
  - South central
  - Southwest



March 2006 Percent of Normal Precipitation  
Period of Normal: 1971-2000

20 40 60 85 115 150 200

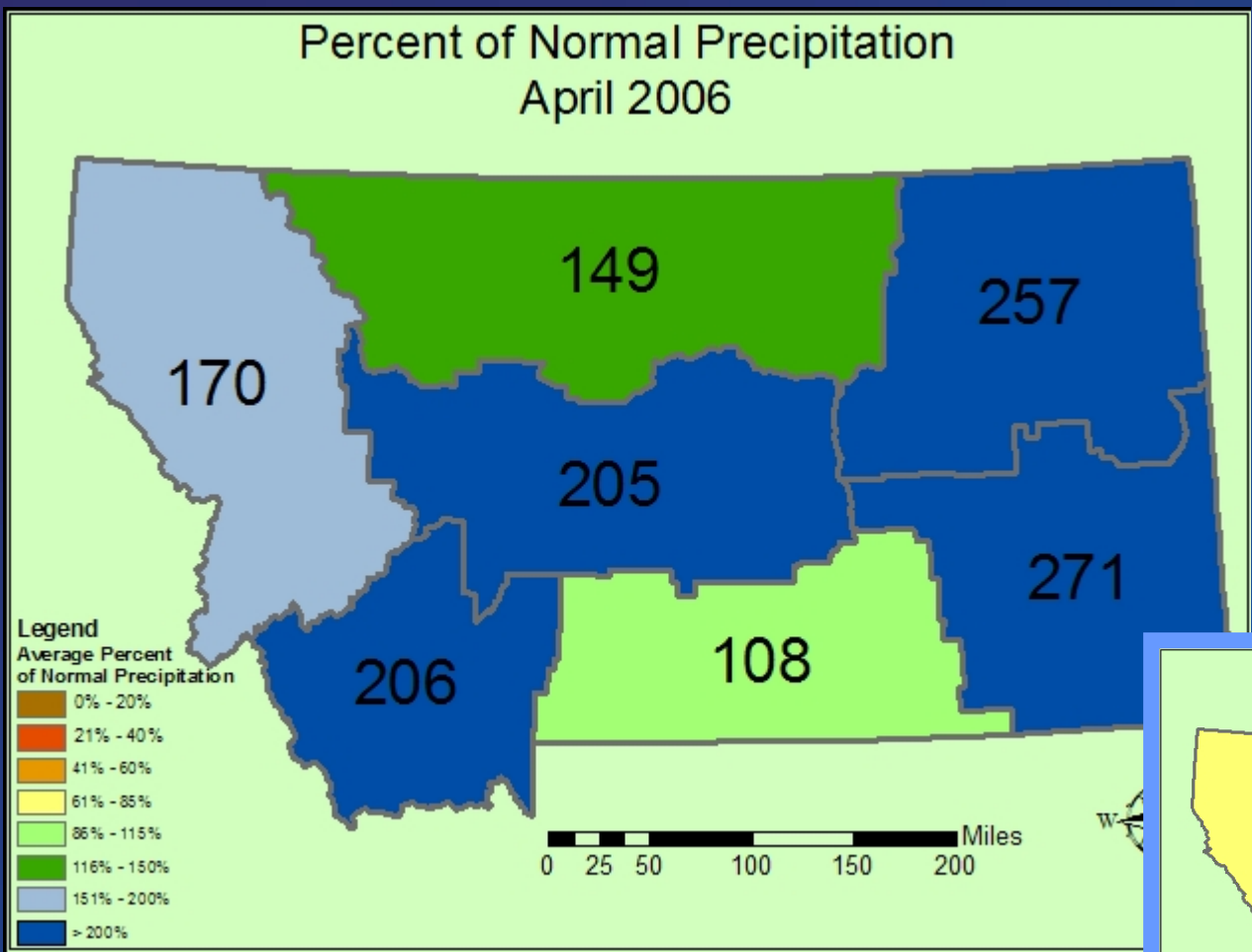
NOTE: Data used to generate this image are  
PROVISIONAL AND SUBJECT TO CHANGE.

March 2006

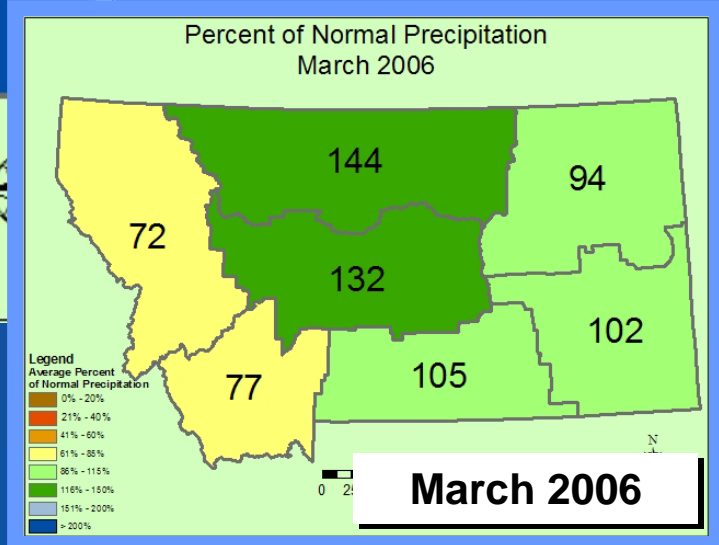


# Percent of Normal Precipitation

## By Climate Division ~ April 2006



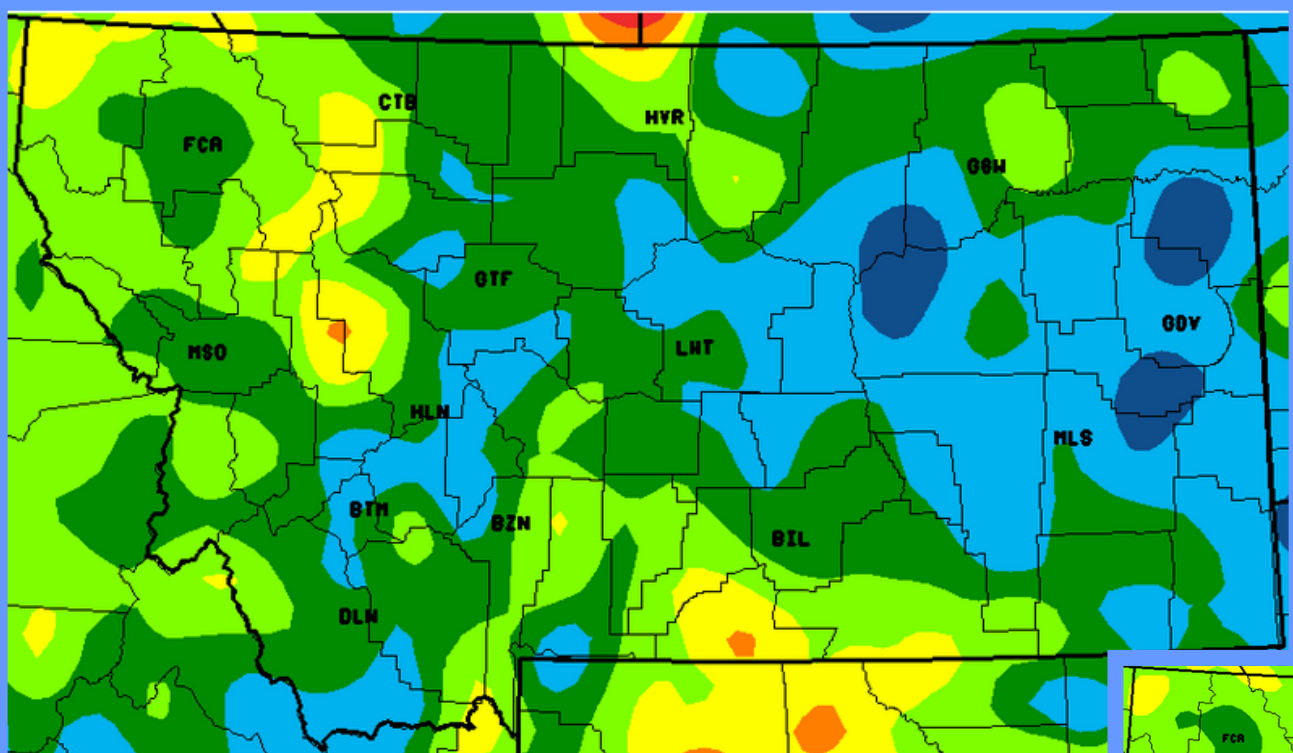
- Five divisions well above normal
  - West
  - Southwest
  - Central
  - Northeast
  - Southeast
- One division above normal
  - North central
- One division near normal
  - South central







# Percent of Normal Precipitation Water Year 2006



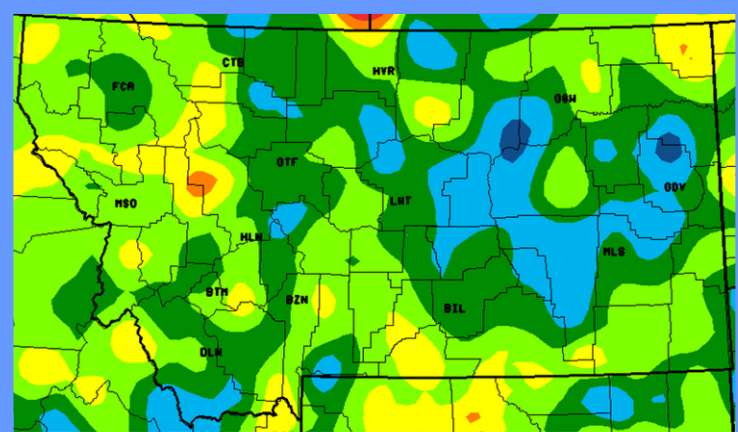
Oct 2005-Apr 2006 Percent of Normal Precipitation  
Period of Normal: 1971-2000

20 40 60 85 115 150 200

NOTE: Data used to generate this image are  
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov>

- October 2005 – April 2006
- Most of Montana at least near normal
  - Large areas above normal
- Only isolated areas below normal



Oct 2005-Mar 2006 Percent of Normal Precipitation  
Period of Normal: 1971-2000

20 40 60 85 115 150 200

NOTE: Data used to generate this image are  
PROVISIONAL AND SUBJECT TO CHANGE.

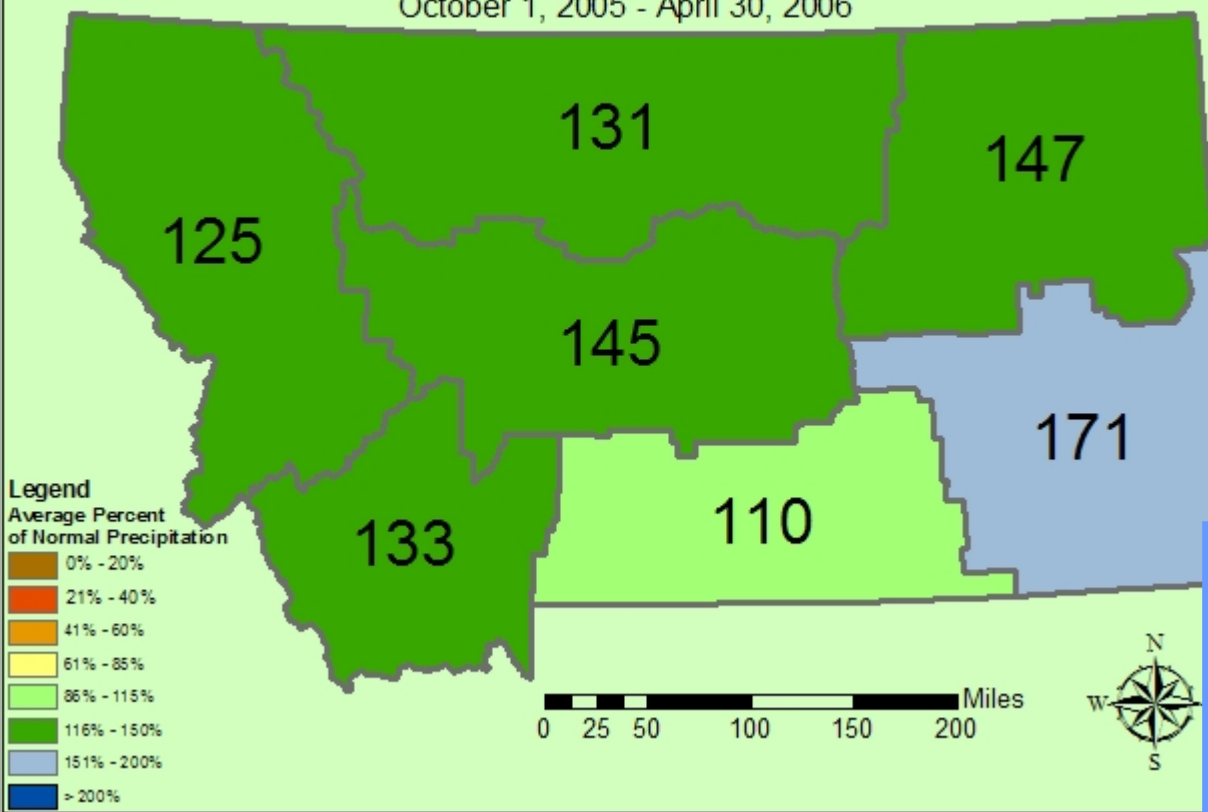
October - March



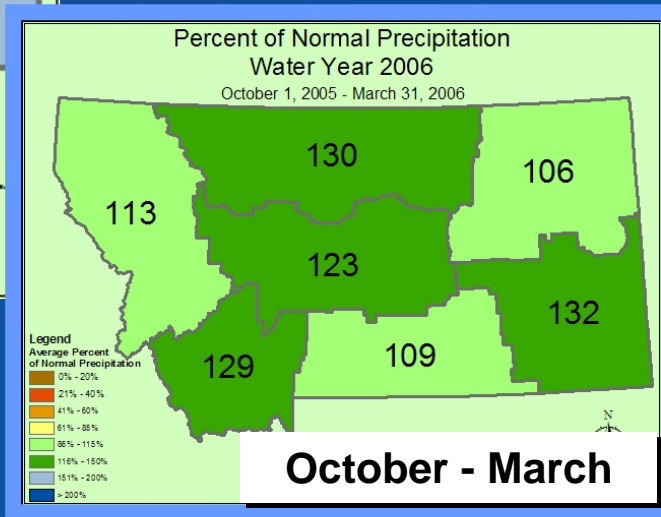
# Percent of Normal Precipitation By Climate Division ~ Water Year 2006

## Percent of Normal Precipitation Water Year

October 1, 2005 - April 30, 2006



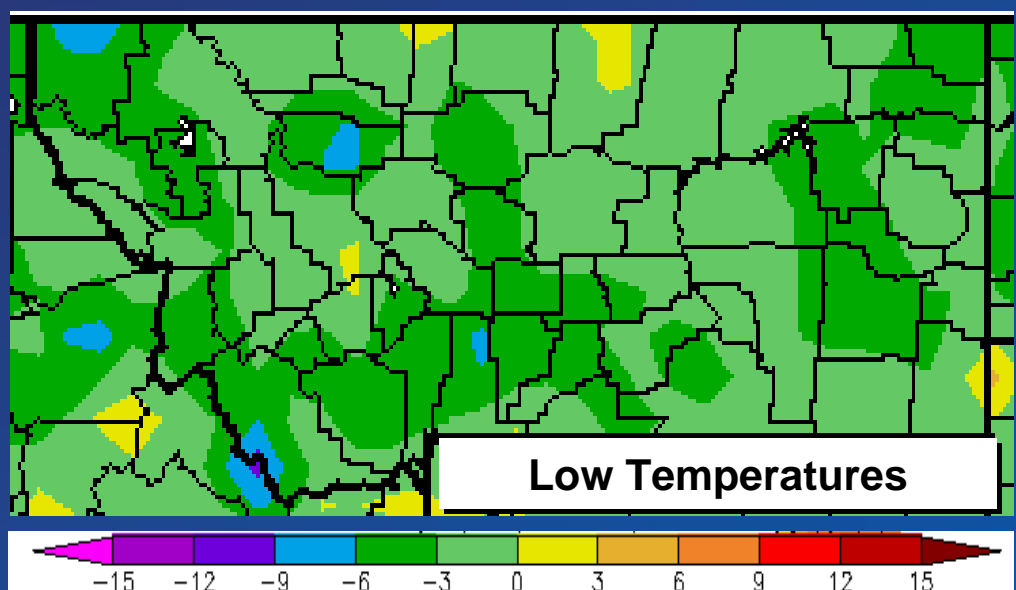
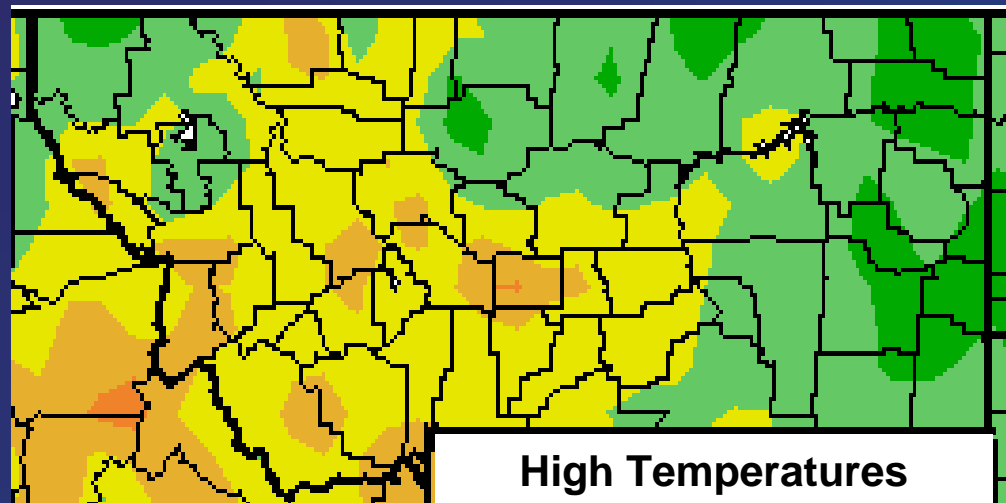
- October 2005 – April 2006
- 6 divisions above to well above normal
  - West
  - Southwest
  - North central
  - Central
  - Northeast
  - Southeast
- One division near normal
  - South central





# Departure from Average Temperature

May 1 – 16



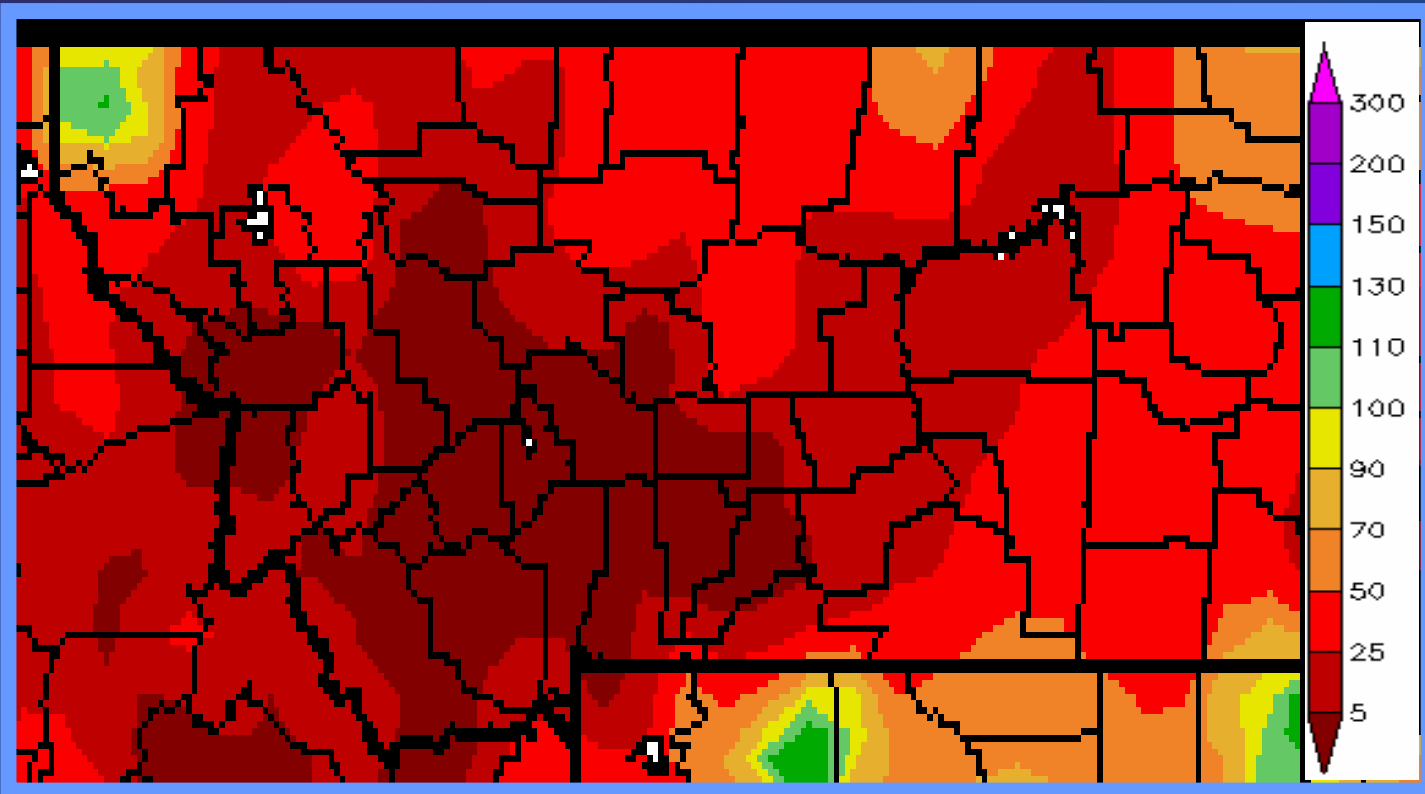
- Temperatures across the state averaged near to below normal
  - *Highs running warmer southwest, west and central*
    - Zero to 6 degrees above normal
  - *Highs cooler northwest, north central and east*
    - Zero to 6 degrees below normal
  - *Lows running 0 to 6 degrees below normal statewide*





# Percent of Average Precipitation

## May 1 – May 16, 2006



- Virtually all of Montana has received less than 50% of normal precipitation
- Large area at less than 5% of normal
  - *Southwest, west, central*



# Precipitation Totals

## May and Water Year 2006

|                   | MAY 1 - 15     |              |             |              | WATER YEAR TO DATE |              |             |              |
|-------------------|----------------|--------------|-------------|--------------|--------------------|--------------|-------------|--------------|
|                   | ACTUAL<br>PCPN | NRML<br>PCPN | +/-<br>NRML | % OF<br>NRML | ACTUAL<br>PCPN     | NRML<br>PCPN | +/-<br>NRML | % OF<br>NRML |
| WESTERN MONTANA   |                |              |             |              |                    |              |             |              |
| BUTTE             | 0.00           | 0.89         | -0.89       | 0            | 7.09               | 5.66         | 1.43        | 125          |
| KALISPELL         | 0.05           | 0.87         | -0.82       | 6            | 9.81               | 9.88         | -0.07       | 99           |
| MISSOULA          | 0.02           | 0.74         | -0.72       | 3            | 10.15              | 6.31         | 3.84        | 161          |
| MULLAN PASS       | 0.36           | 1.34         | -0.98       | 27           | 34.66              | 26.24        | 8.42        | 132          |
| SOUTHWEST MONTANA |                |              |             |              |                    |              |             |              |
| BIG SKY           | 0.22           | 1.08         | -0.86       | 20           | 16.22              | 11.00        | 5.22        | 147          |
| BOULDER           | 0.00           | 0.87         | -0.87       | 0            | 5.55               | 4.45         | 1.10        | 125          |
| BELGRADE FIELD    | 0.01           | 1.10         | -1.09       | 1            | 7.59               | 7.15         | 0.44        | 106          |
| BOZEMAN MSU       | 0.03           | 1.46         | -1.43       | 2            | 12.57              | 9.96         | 2.61        | 126          |
| DILLON AIRPORT    | 0.00           | 0.82         | -0.82       | 0            | 4.48               | 3.99         | 0.49        | 112          |
| ENNIS             | 0.01           | 0.97         | -0.96       | 1            | 6.67               | 6.16         | 0.51        | 108          |
| HELENA            | 0.00           | 0.81         | -0.81       | 0            | 6.35               | 4.83         | 1.52        | 131          |
| LAKEVIEW          | 0.00           | 1.14         | -1.14       | 0            | 9.22               | 10.02        | -0.80       | 92           |
| ROGERS PASS 9 NNE | 0.00           | 1.51         | -1.51       | 0            | 7.30               | 8.26         | -0.96       | 88           |
| TOWNSEND          | 0.00           | 0.71         | -0.71       | 0            | 5.67               | 3.94         | 1.73        | 144          |
| W YELLOWSTONE     | 0.16           | 0.99         | -0.83       | 16           | 14.55              | 13.66        | 0.89        | 107          |
| WISDOM            | 0.01           | 0.74         | -0.73       | 1            | 7.48               | 5.77         | 1.71        | 130          |



# Precipitation Totals

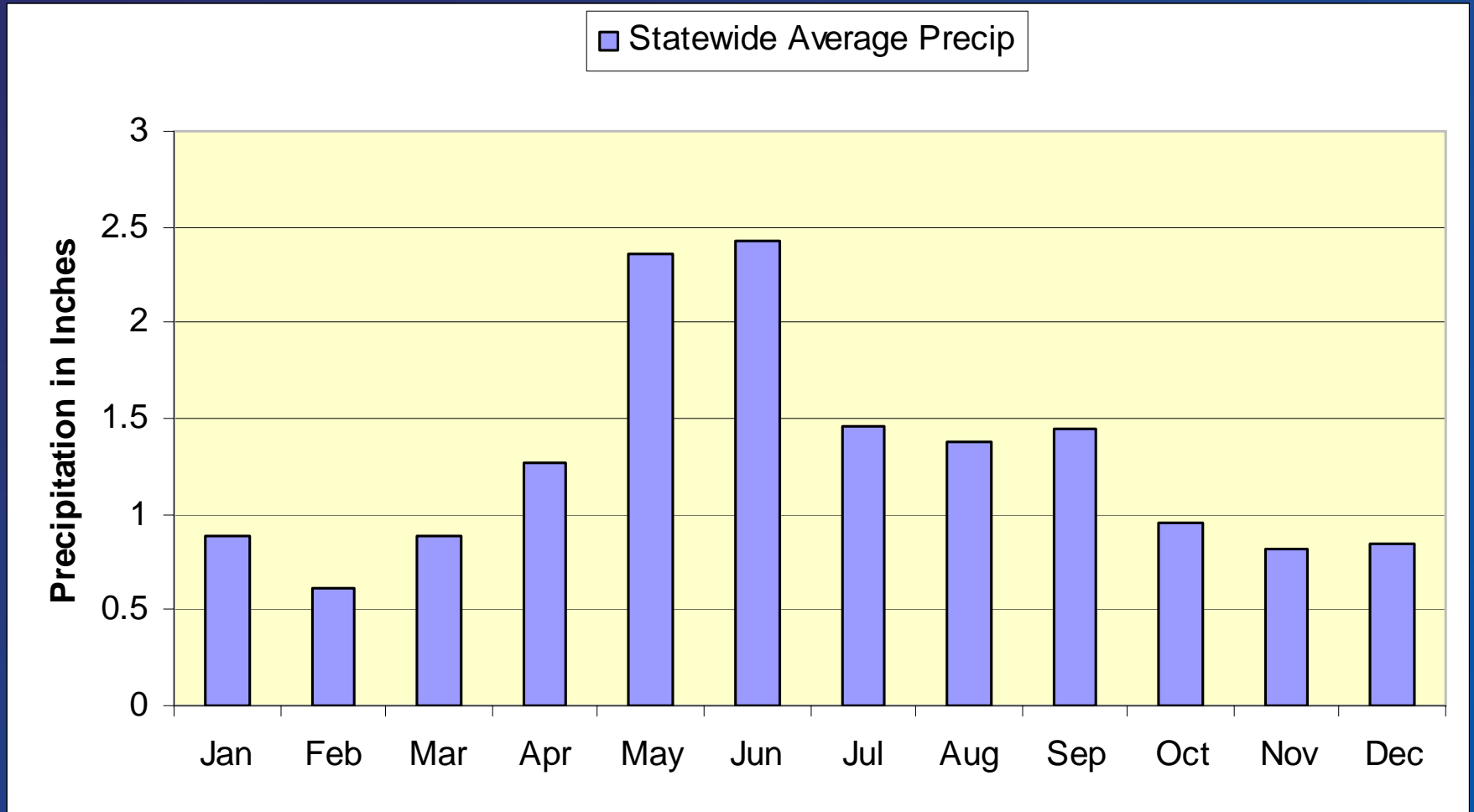
## May and Water Year 2006

|                        | ACTUAL<br>PCPN | MAY 1 - 15<br>NRML<br>PCPN | +/-<br>NRML | % OF<br>NRML | WATER YEAR TO DATE<br>ACTUAL<br>PCPN | NRML<br>PCPN | +/-<br>NRML | % OF<br>NRML |
|------------------------|----------------|----------------------------|-------------|--------------|--------------------------------------|--------------|-------------|--------------|
| <b>CENTRAL MONTANA</b> |                |                            |             |              |                                      |              |             |              |
| BILLINGS               | 0.15           | 1.19                       | -1.04       | 13           | 8.24                                 | 8.07         | 0.17        | 102          |
| CASCADE 20 SSE         | 0.00           | 1.20                       | -1.20       | 0            | 7.02                                 | 5.90         | 1.12        | 119          |
| CHINOOK                | 0.09           | 1.01                       | -0.92       | 9            | 4.89                                 | 5.06         | -0.17       | 97           |
| CHOTEAU                | 0.00           | 0.83                       | -0.83       | 0            | 5.63                                 | 3.61         | 2.02        | 156          |
| FORT ASSINNIBOINE      | 0.29           | 0.94                       | -0.65       | 31           | 4.79                                 | 5.16         | -0.37       | 93           |
| FORT BENTON            | 0.18           | 0.98                       | -0.80       | 18           | 6.95                                 | 5.84         | 1.11        | 119          |
| GOLD BUTTE 7 N         | 0.22           | 0.91                       | -0.69       | 24           | 5.15                                 | 5.13         | 0.02        | 100          |
| GRASS RANGE            | 0.11           | 1.35                       | -1.24       | 8            | 9.16                                 | 7.05         | 2.11        | 130          |
| GREAT FALLS            | 0.13           | 1.12                       | -0.99       | 12           | 8.50                                 | 6.94         | 1.56        | 122          |
| HARLEM                 | 0.13           | 0.84                       | -0.71       | 15           | 5.23                                 | 4.03         | 1.20        | 130          |
| HAVRE                  | 0.25           | 0.80                       | -0.55       | 31           | 4.13                                 | 4.78         | -0.65       | 86           |
| LIVINGSTON             | 0.01           | 1.27                       | -1.26       | 1            | 7.22                                 | 7.32         | -0.10       | 99           |
| LEWISTOWN              | 0.43           | 1.26                       | -0.83       | 34           | 8.61                                 | 7.89         | 0.72        | 109          |
| MARTINSDALE 3 NNW      | 0.00           | 0.97                       | -0.97       | 0            | 6.10                                 | 5.48         | 0.62        | 111          |
| NEIHART 8 NNW          | 0.19           | 1.57                       | -1.38       | 12           | 11.32                                | 9.78         | 1.54        | 116          |
| SHELBY                 | 0.19           | 0.73                       | -0.54       | 26           | 3.67                                 | 2.98         | 0.69        | 123          |
| STANFORD               | 0.03           | 1.25                       | -1.22       | 2            | 7.34                                 | 7.23         | 0.11        | 102          |
| SWEET GRASS            | 0.32           | 1.07                       | -0.75       | 30           | 5.59                                 | 4.63         | 0.96        | 121          |
| VALIER                 | 0.13           | 0.92                       | -0.79       | 14           | 4.75                                 | 4.23         | 0.52        | 112          |
| WHITE SULPHUR SPRGS    | 0.00           | 1.01                       | -1.01       | 0            | 5.82                                 | 5.78         | 0.04        | 101          |
| <b>EASTERN MONTANA</b> |                |                            |             |              |                                      |              |             |              |
| GLASGOW                | 0.12           | 0.70                       | -0.58       | 17           | 4.28                                 | 4.02         | 0.26        | 106          |
| MILES CITY             | 0.31           | 0.97                       | -0.66       | 32           | 7.57                                 | 5.87         | 1.70        | 129          |
| YELLOWSTONE LAKE       | 0.71           | 0.94                       | -0.23       | 76           | 15.09                                | 12.26        | 2.83        | 123          |



# Statewide Average Precipitation

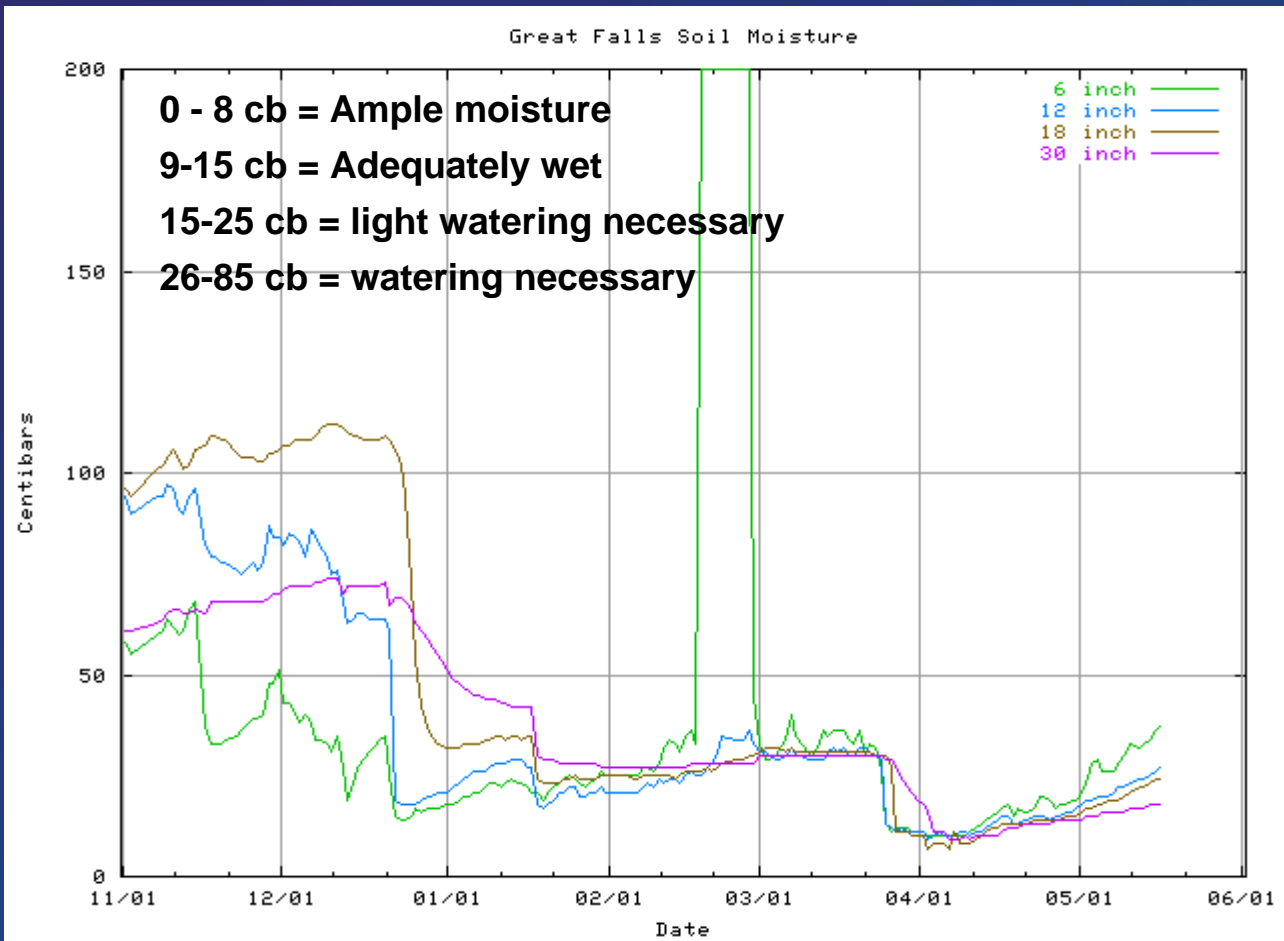
## May is second wettest month





# Great Falls Soil Moisture

## Drying at all levels



- 💧 Lack of precipitation
- 💧 Evapotranpiration

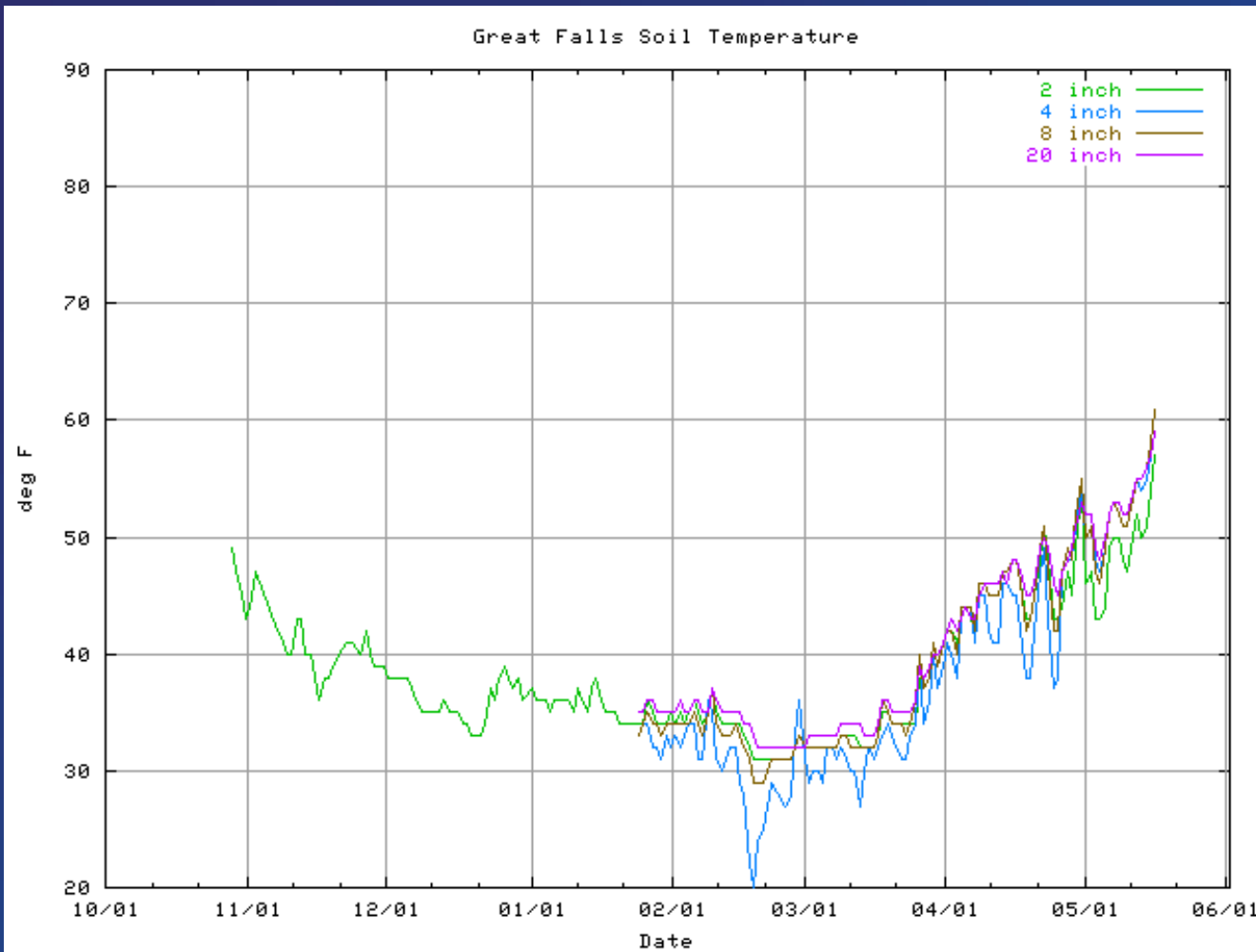
6" = 41 cb  
12" = 30 cb  
18" = 25 cb  
30" = 19 cb





# Great Falls Soil Temperature

## May 16 ~ Noon

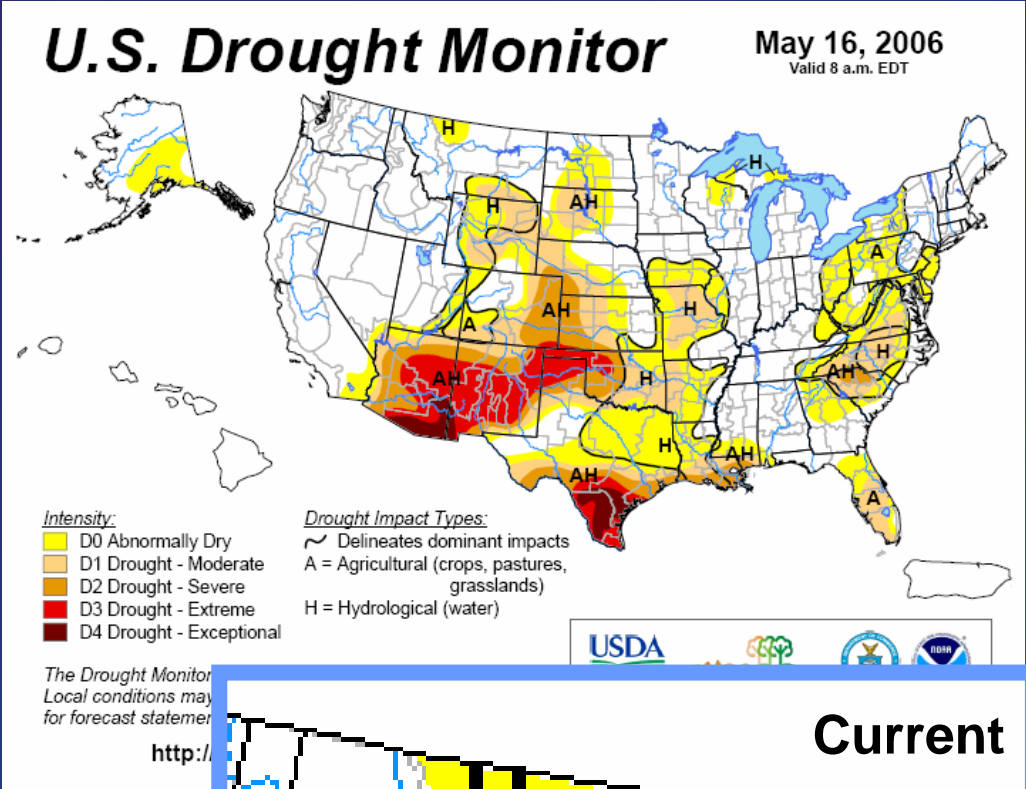


**2" = 57°F**  
**4" = 59°F**  
**8" = 61°F**  
**20" = 59°F**

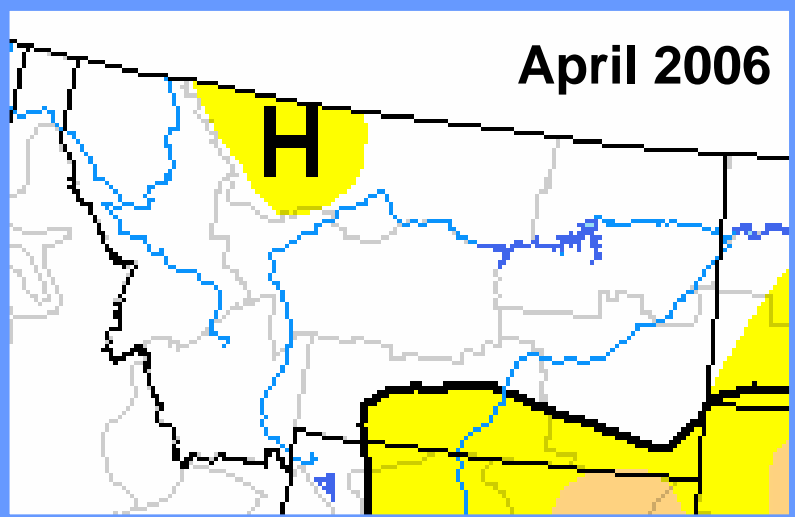
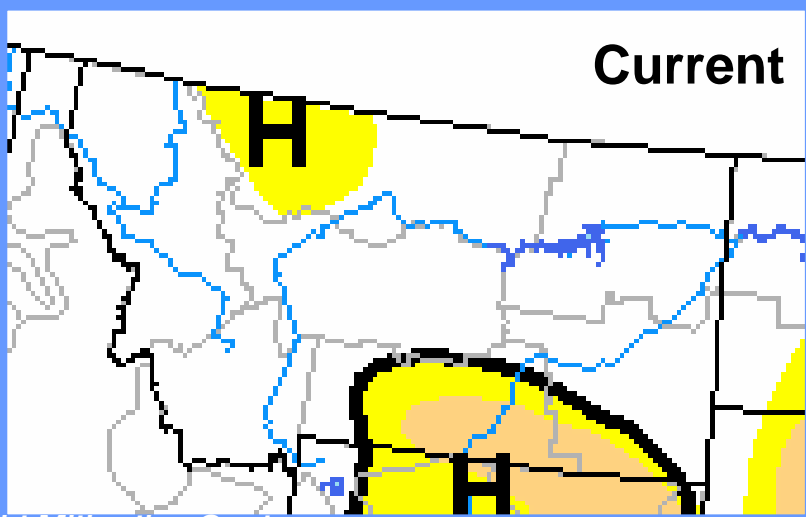


# National Drought Monitor

May 16, 2006



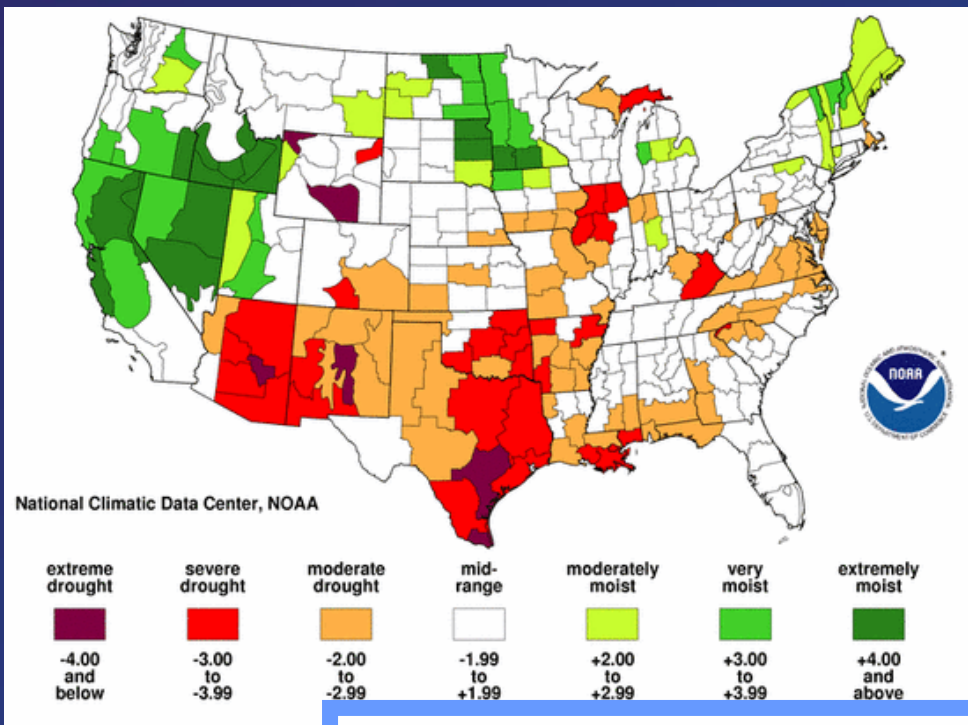
- Expansion of 'Moderate Drought (D1) into south central Montana
- Some lingering areas of 'Abnormally Dry' (D0)
  - Northern Rocky Mountain Front
  - South central – southeast
  - Northeast
- Most of Montana cleared of any drought category



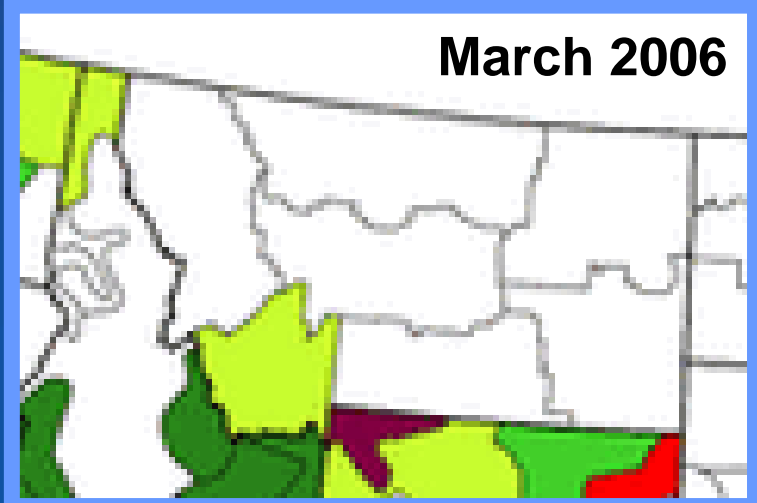
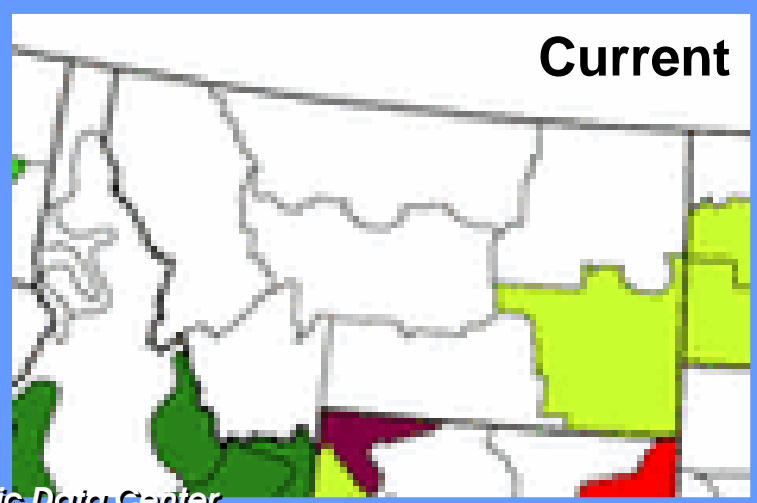


# Palmer Hydrological Drought Index

## April 2006



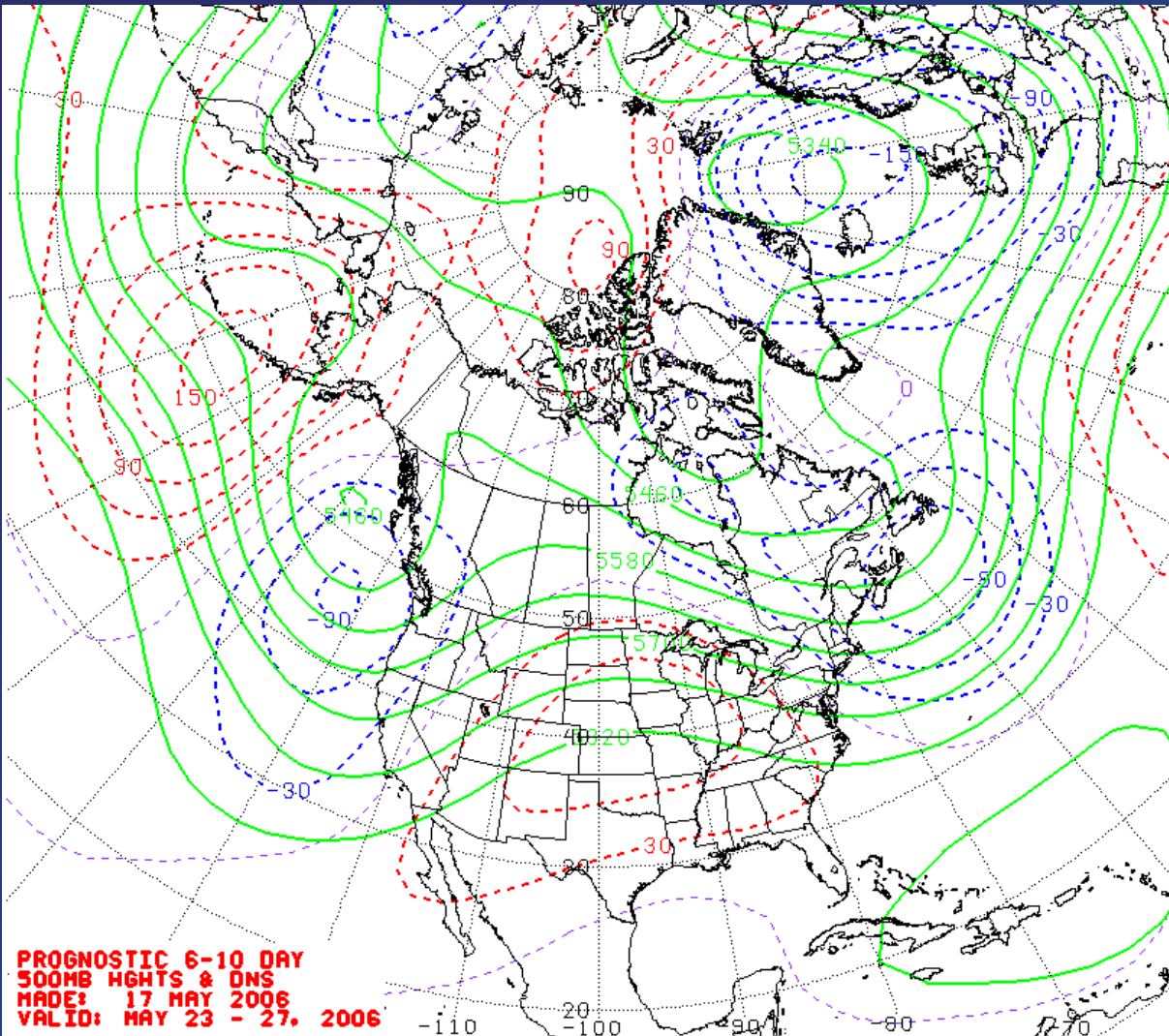
- No climate divisions classified as 'Drought'
- 1 climate division 'Moderately Moist'
  - Southeast
- All other climate divisions 'Mid-Range'





# 6 to 10 Day Outlook

## 500mb Heights and Anomalies



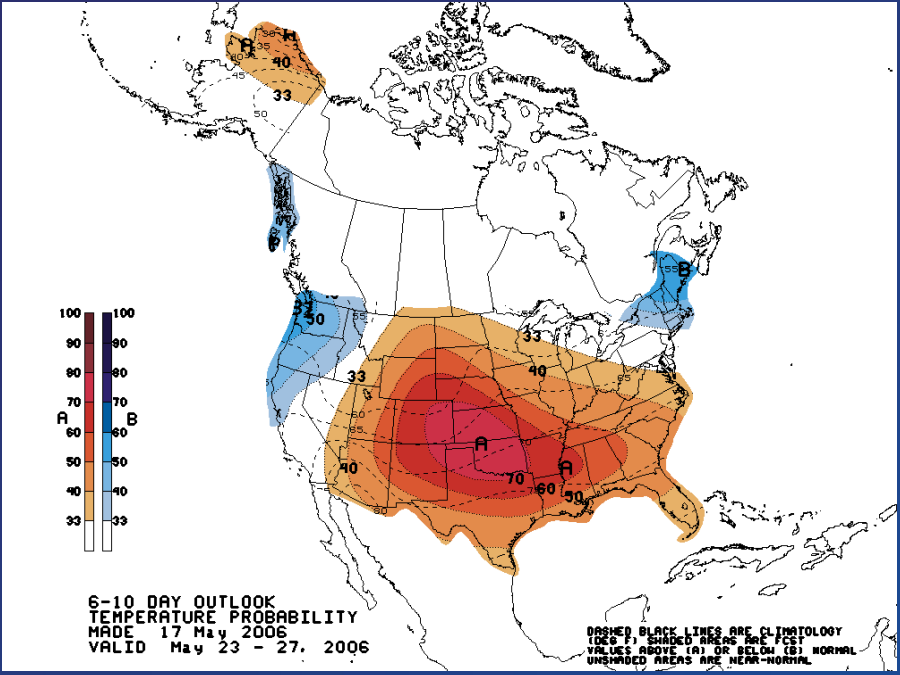
- Hot, dry high pressure ridge to weaken as low pressure trough pushes in from the west
  - Cooler temperatures
  - Slightly increased chances of precipitation



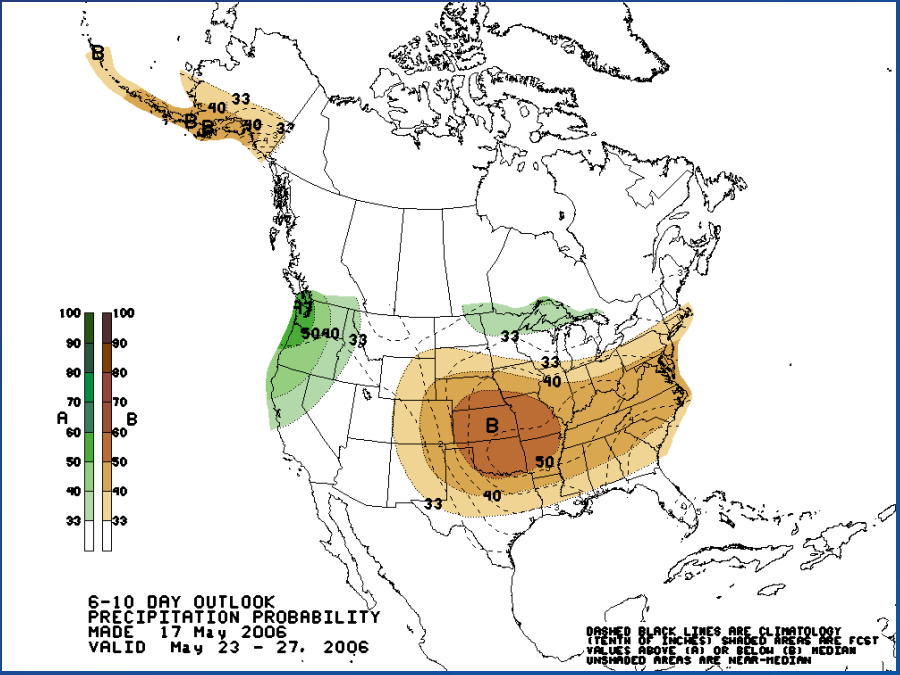
# 6 to 10 Day Outlook

## Warm and dry

### Temperature



### Precipitation



- West – 33% to 40% chance for below normal temperatures
- Central and East – 33% to 60% chance for above normal temperatures

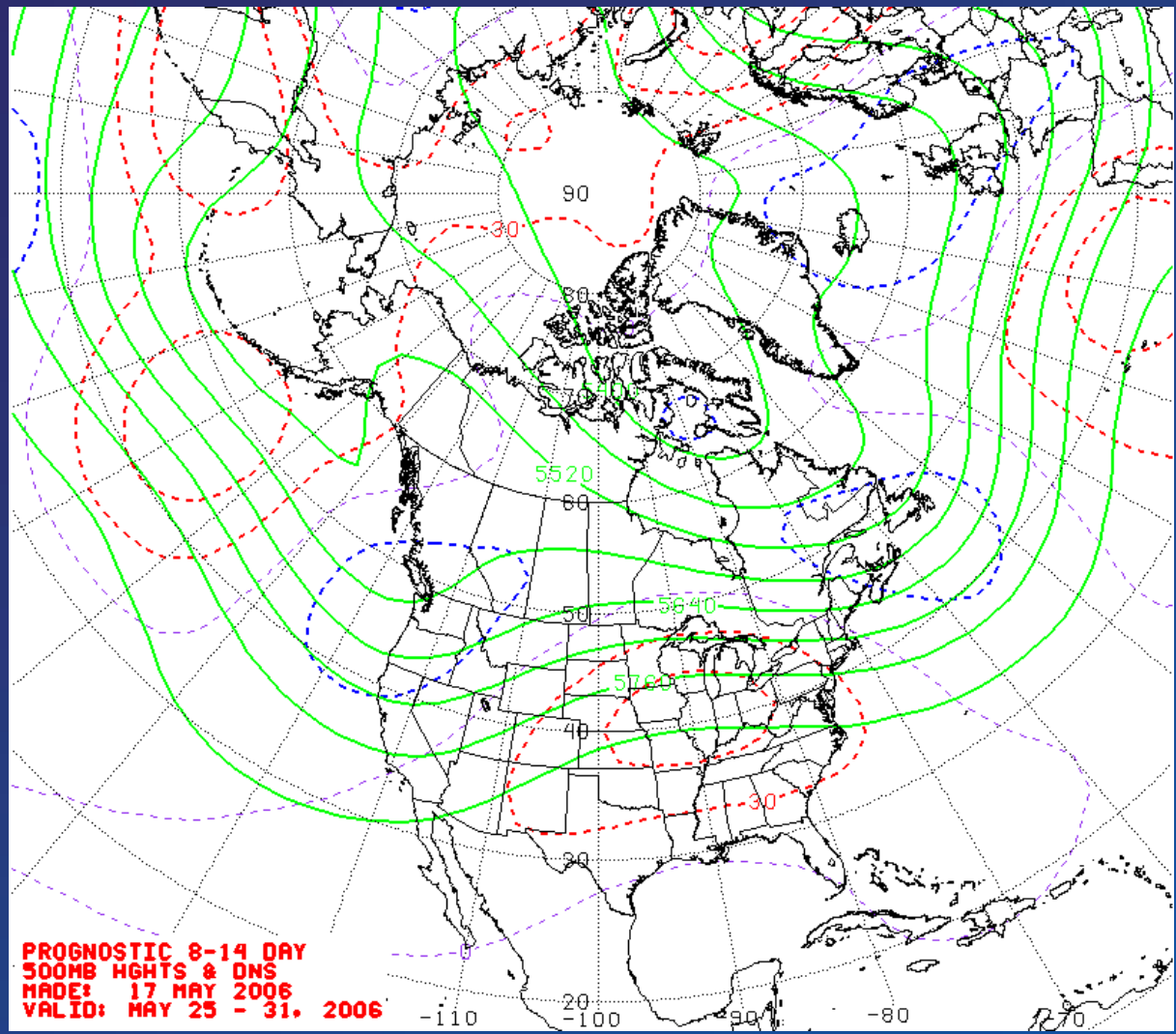
- Most of Montana - Equal chances for above... below or near normal precipitation





# 8 to 14 Day Outlook

## 500mb Heights and Anomalies



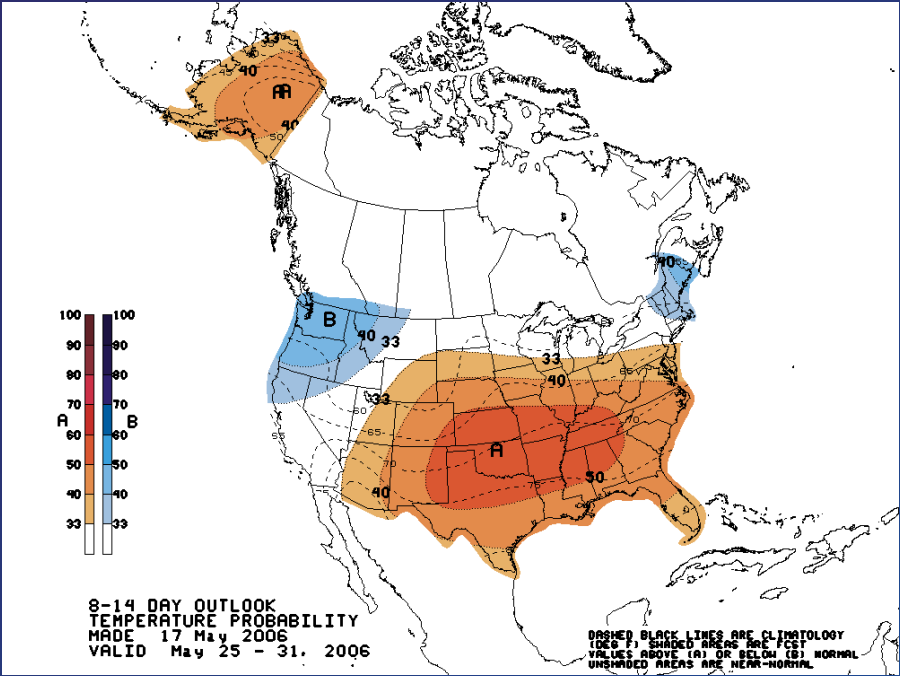
PROGNOSTIC 8-14 DAY  
500MB HGHTS & DNS  
MADE: 17 MAY 2006  
VALID: MAY 25 - 31, 2006

- Trough further inland, ridge weaker and over central/southern U.S.
  - *Near normal temperatures*
  - *Better chances of precipitation*
    - Mainly west



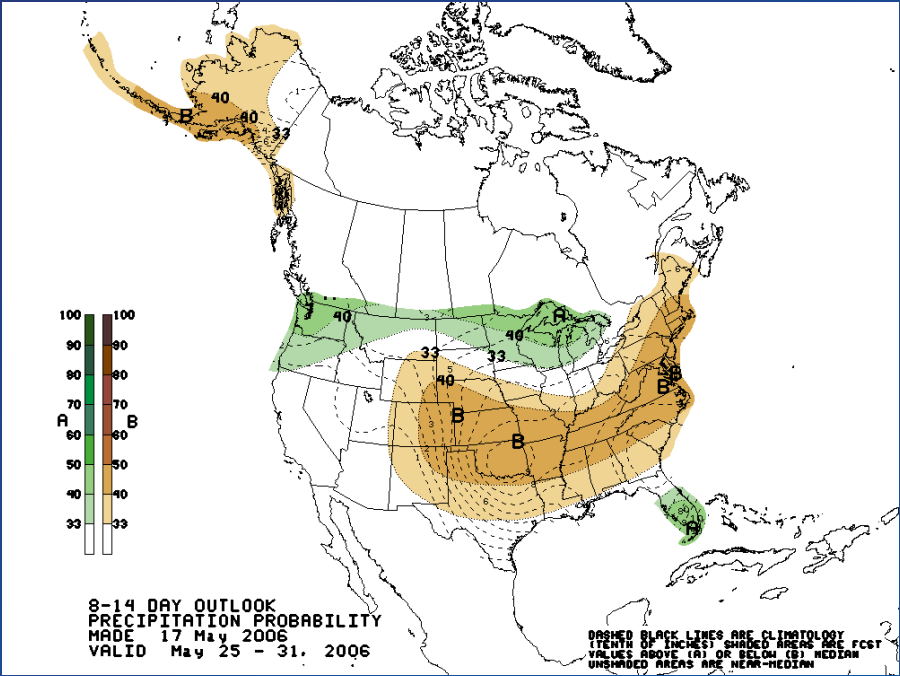
# 8 to 14 Day Outlook

## Temperature



- West and North central – 33% to 50% chance for below normal temperatures
- Normal temperature ranges for late May
  - Highs in the mid 60s to near 70
  - Lows in the mid 30s to near 40

## Precipitation

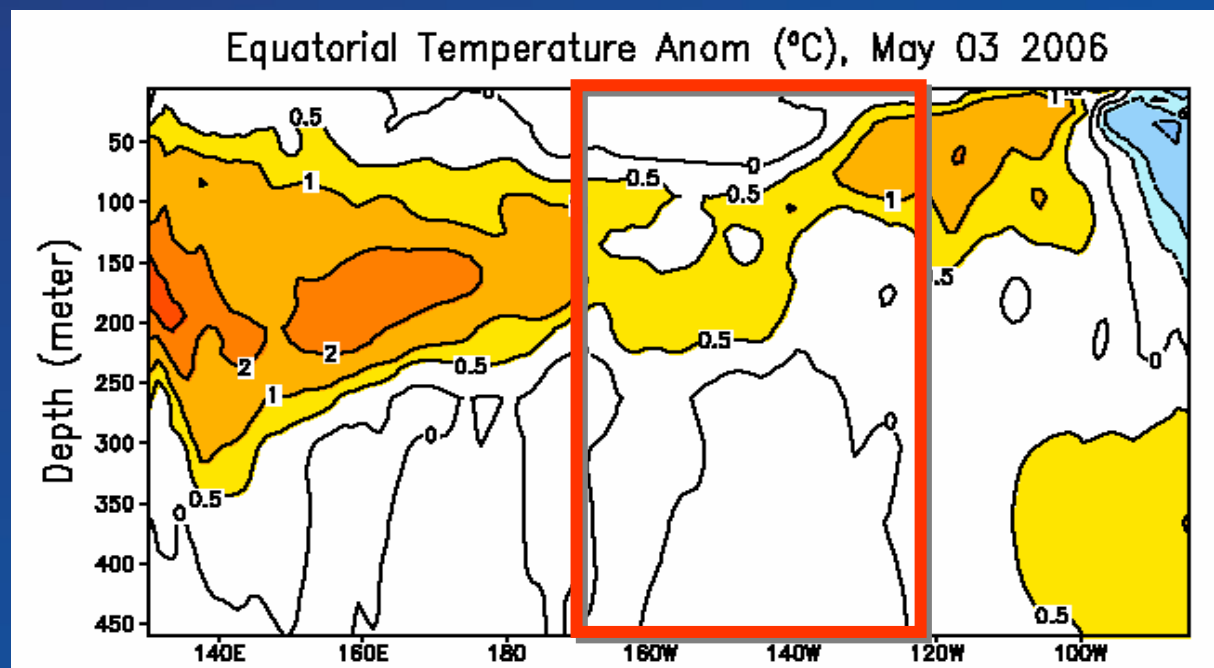
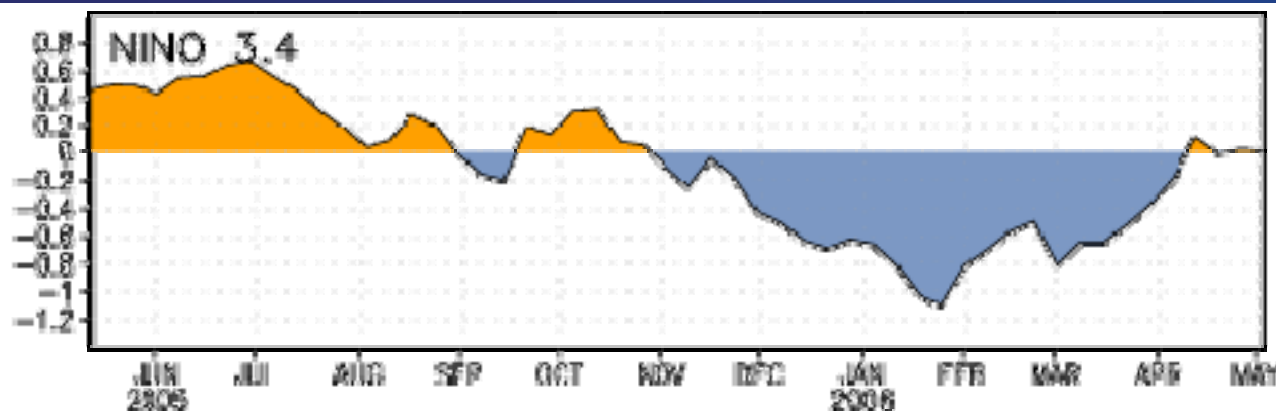


- West and North – 33% to 40% chance for above normal precipitation
- Extreme southeast – 33% to 40% chance of below normal precipitation
- Normal precipitation ranges for May
  - ~2.00 – 3.00 inches



# Current Status of El Niño/La Niña

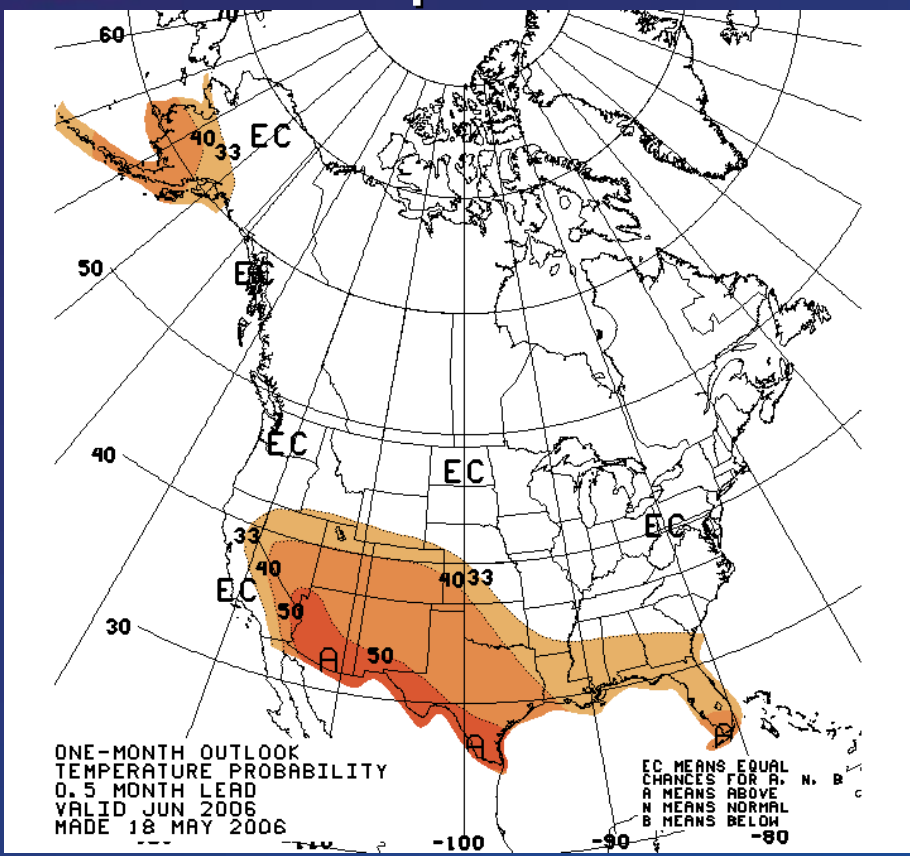
## ENSO-neutral conditions expected to prevail next 3-6 months



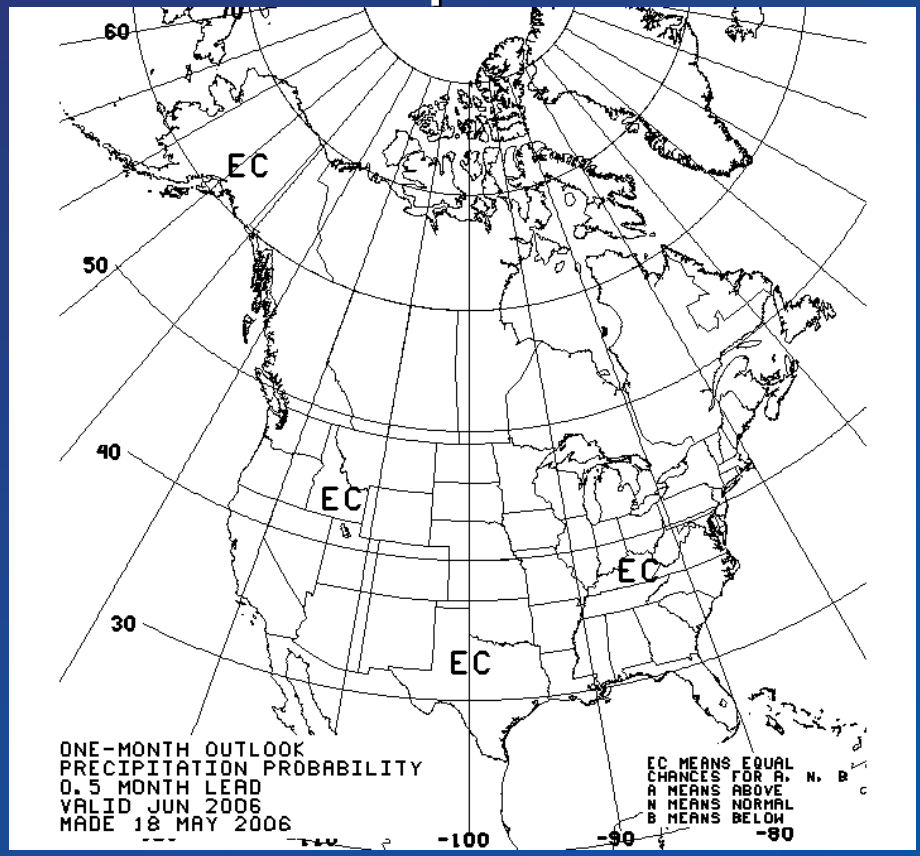


# June Outlook

## Temperature



## Precipitation



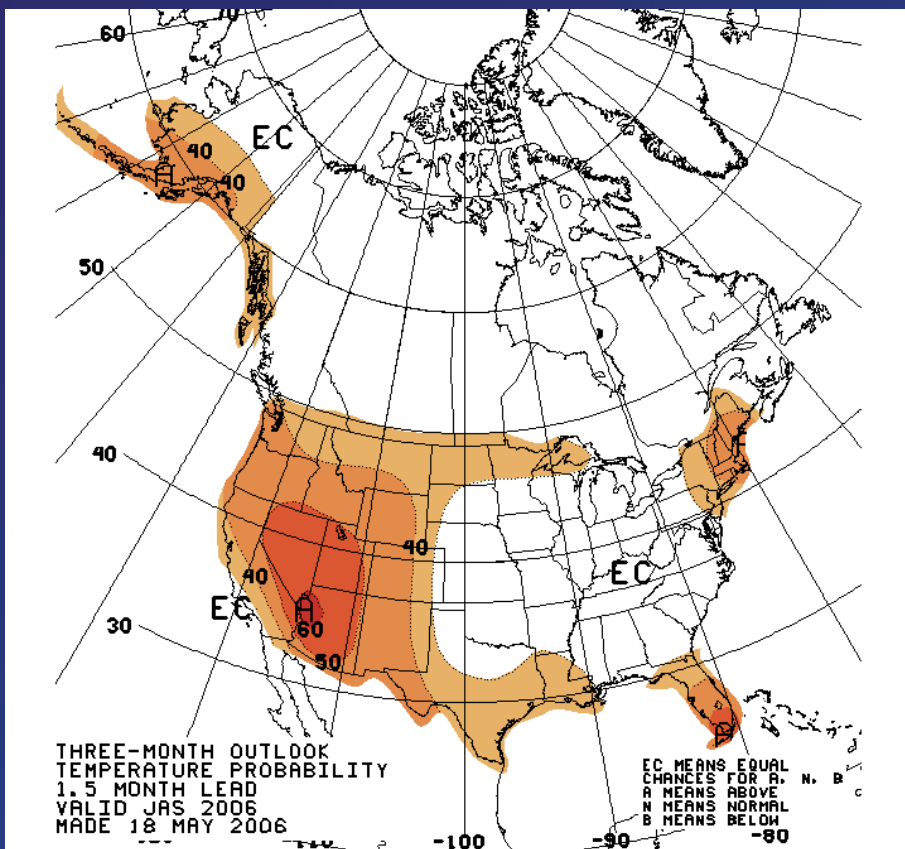
- No forecast skill... i.e. equal chances for above... below or near normal temperatures for all of Montana
- Normal temperature ranges for June
  - *Highs in the upper 60s and 70s*
  - *Lows in the upper 30s and 40s*

- No forecast skill... i.e. equal chances of above... below or near normal precipitation for all of Montana
- Normal precipitation ranges for June
  - *~2.00 – 3.00 inches*



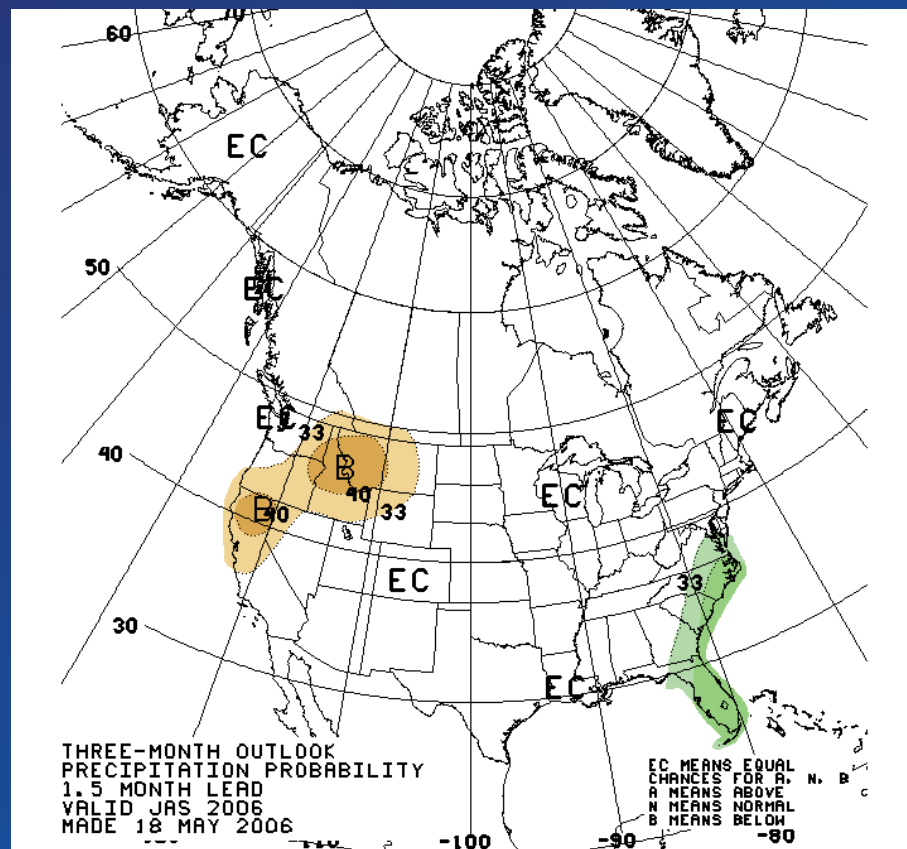
# July – September Outlook

## Temperature



- North and East – 33% to 40% chance of above normal temperatures
- Southwest and South central – 40% to 50% chance of above normal temperatures

## Precipitation



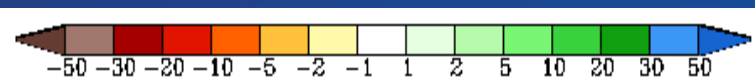
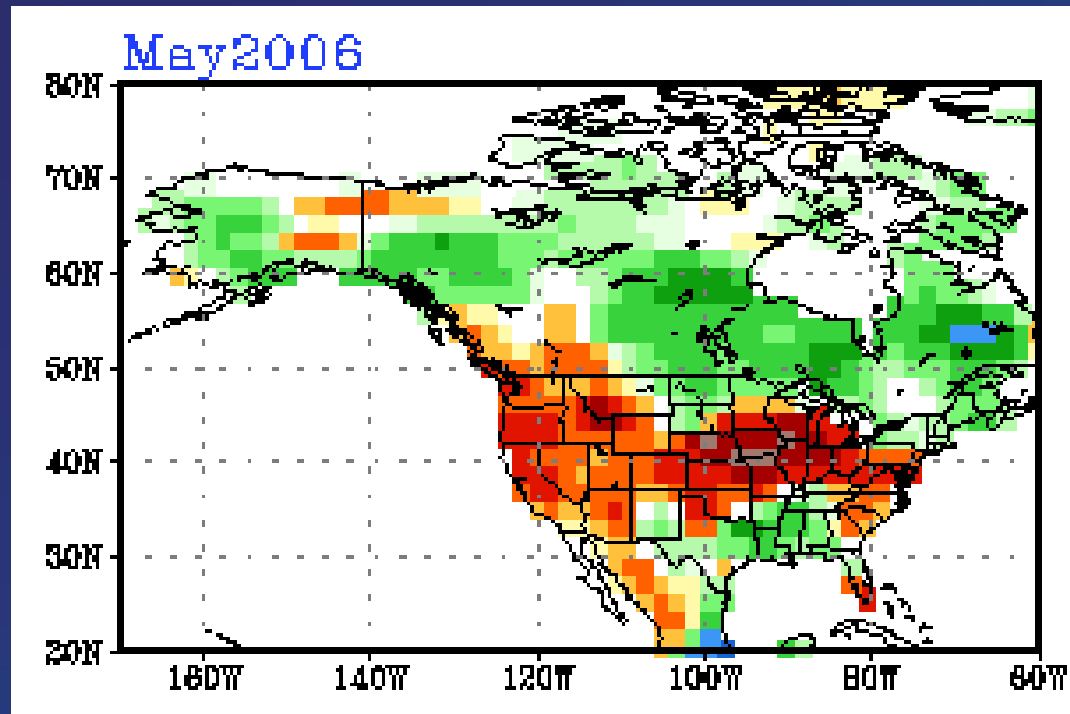
- West and Central – 33% to 50% chance of below normal precipitation
- East - No forecast skill... i.e. equal chances of above... below or near normal precipitation





# Climate Forecast System

## Monthly Precipitation Forecast

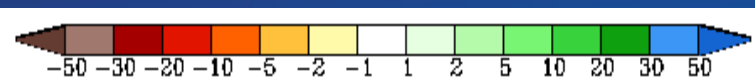
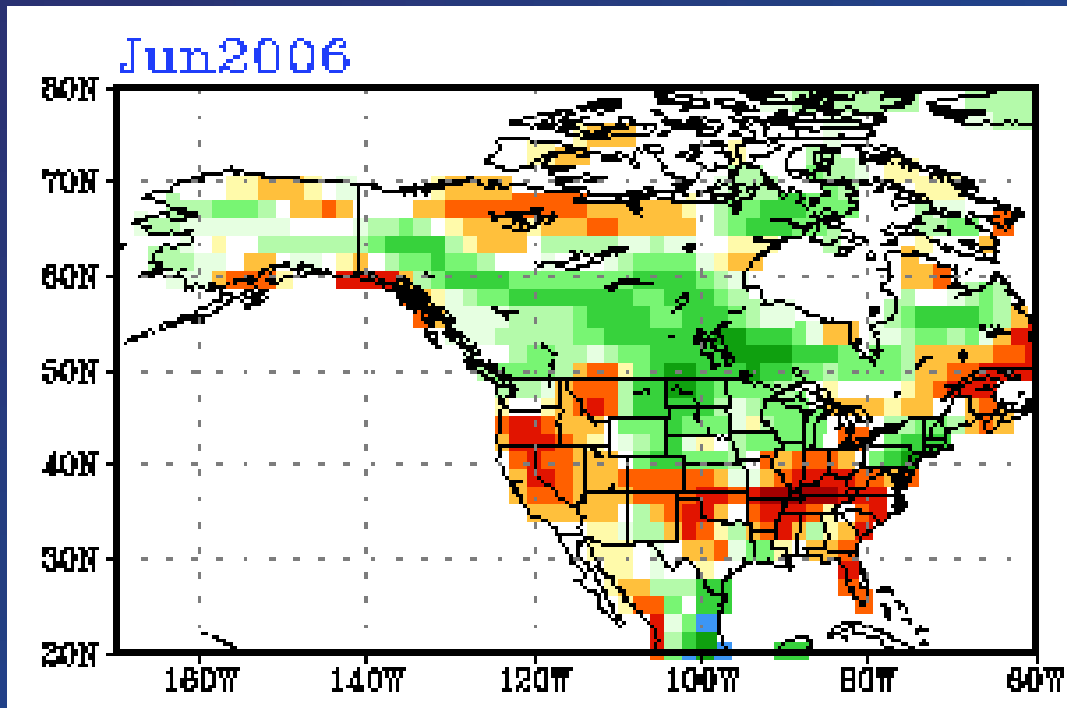


mm/month



# Climate Forecast System

## Monthly Precipitation Forecast

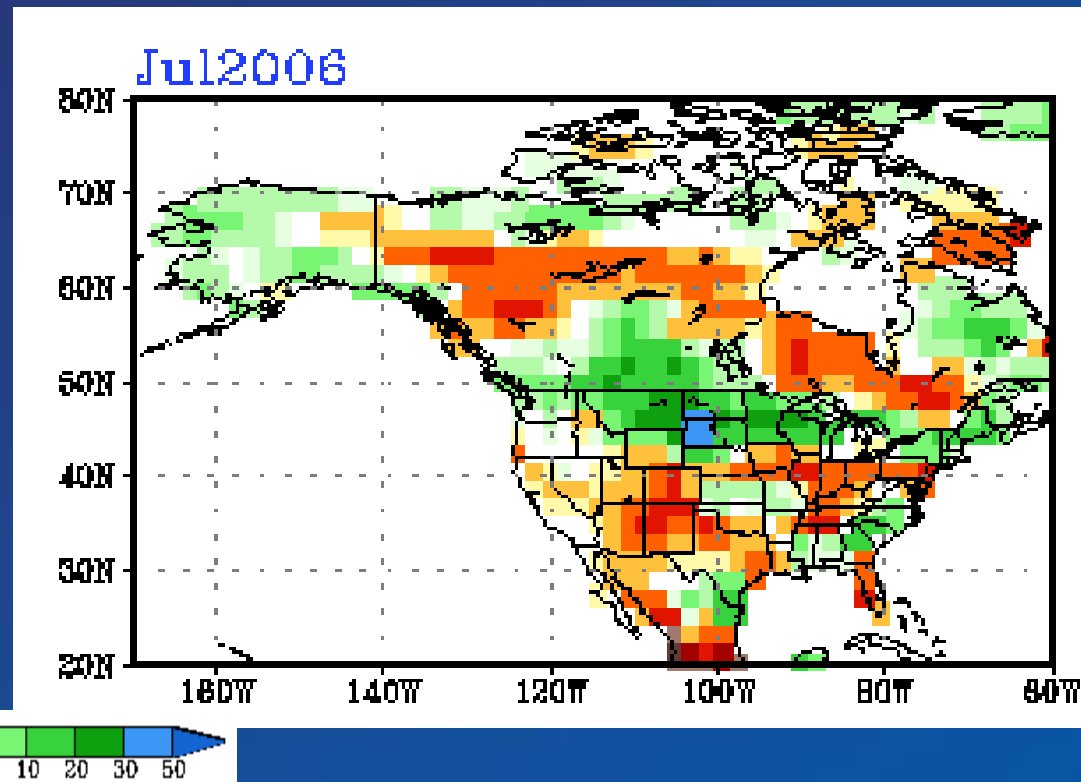


mm/month



# Climate Forecast System

## Monthly Precipitation Forecast

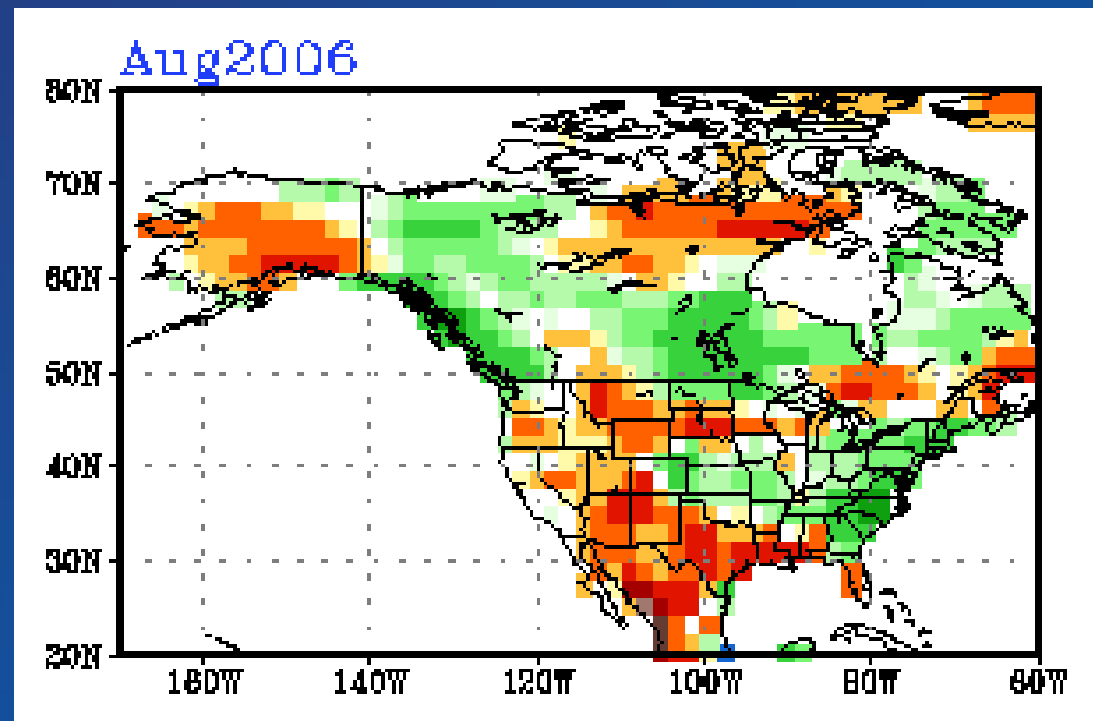
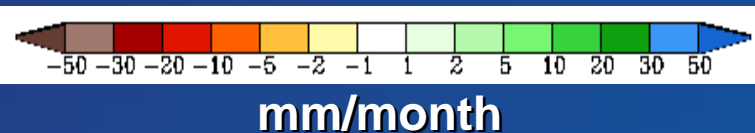


mm/month



# Climate Forecast System

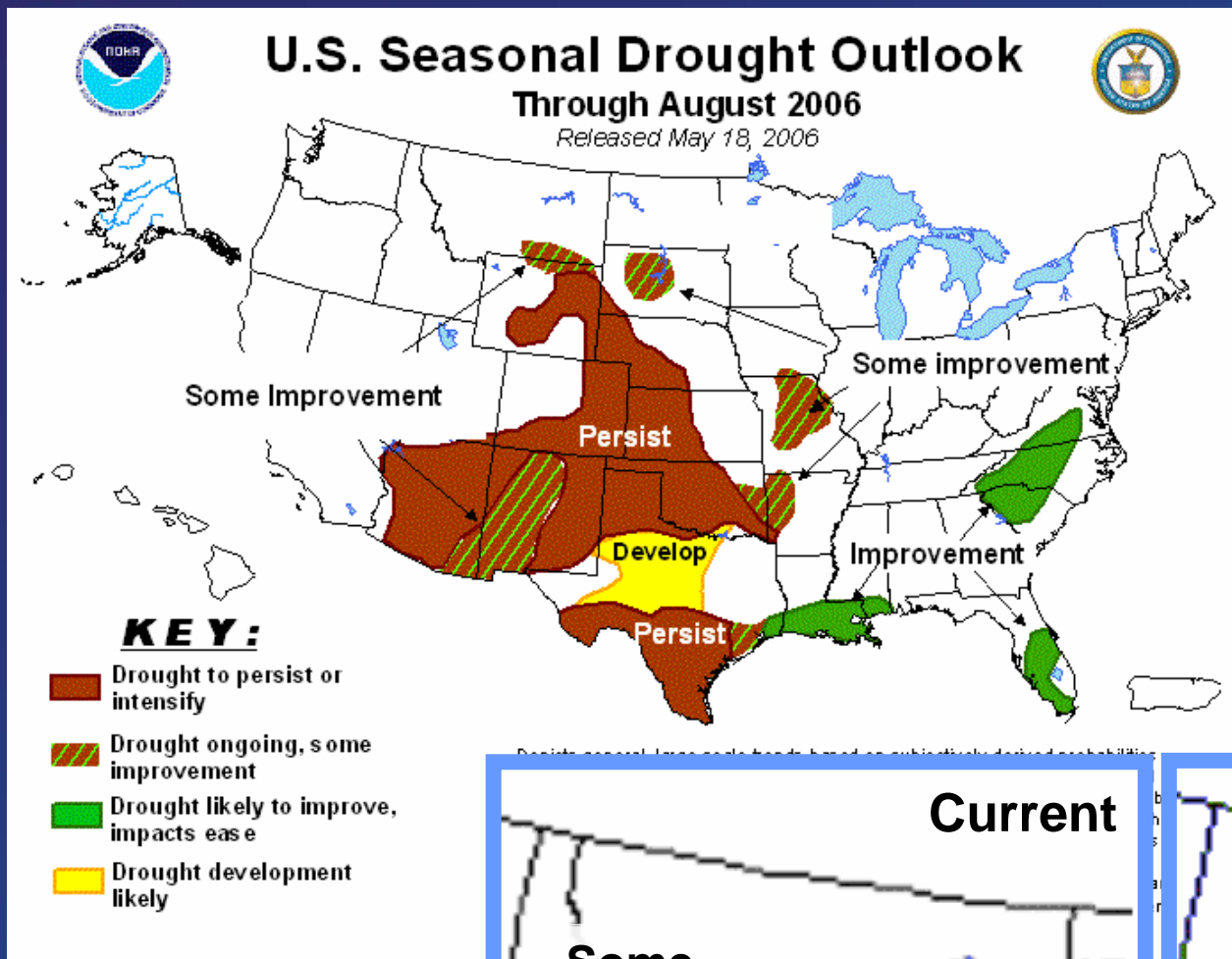
## Monthly Precipitation Forecast



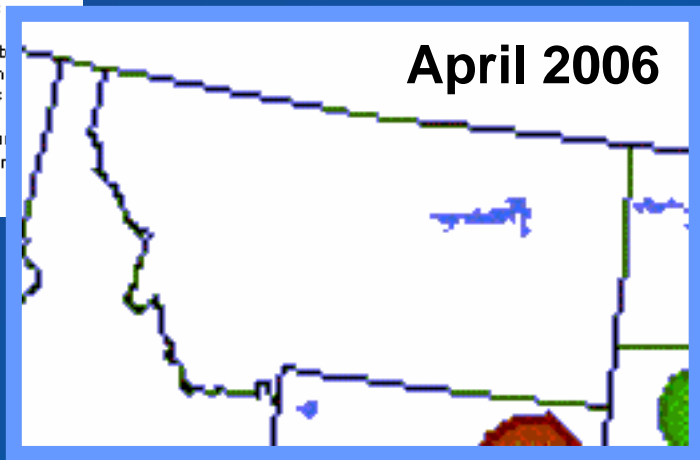
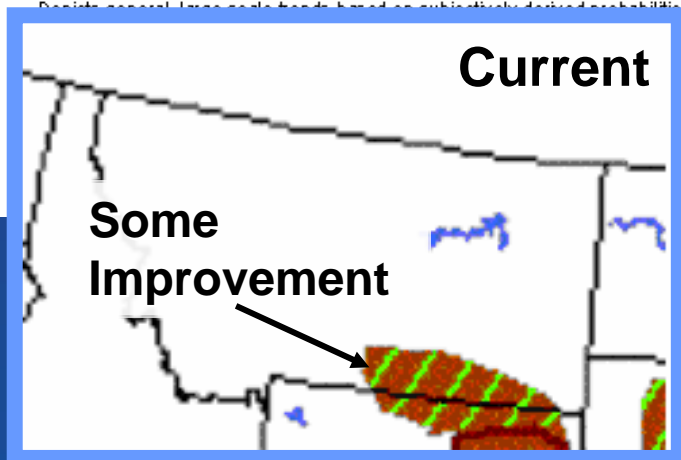


# Drought Outlook through August

Issued May 18, 2006



Some improvement expected in south central Montana







# In Summary...

- 💧 May, so far, dismally dry
- 💧 In spite of recent dry weather, water year precipitation remains above to well above average across most of the state
  - *Only small pockets below average*
    - South central Montana
- 💧 Current forecasts indicate should see more precipitation
  - *Short term*
  - *Long term*



**weather.gov**

**weather.gov/billings**

**weather.gov/glasgow**

**weather.gov/missoula**

**weather.gov/greatfalls**